WHAT IS CLAIMED IS:

1. A method for bonding an electrically conductive silicon carbide structure to an electrically conductive siliconized silicon carbide structure comprising the steps of:

a) temporarily securing the siliconized silicon carbide structure to the silicon carbide structure,

b) placing the silicon carbide structure with secured siliconized silicon carbide structure into an induction heating furnace having an induction coil which heats electrically conductive material in the furnace when sufficient electrical energy at a frequency of from about 300 to about 1000 KC is passed through the coil;

c) causing sufficient electrical energy at a frequency of from about 300 to about 1000 KC to be passed through the coil to raise the temperature of the siliconized silicon carbide structure and silicon carbide structure to a temperature above about 1500°C at the region of temporary attachment to release the attachment and cause silicon metal to flow from the siliconized silicon carbide structure into the silicon carbide structure to form a siliconized silicon carbide bond between the silicon carbide structure and siliconized silicon carbide structure; and

d) cooling the resulting silicon carbide structure and siliconized silicon carbide structure to obtain an article including a silicon carbide portion and siliconized silicon carbide portion connected with at least one siliconized silicon carbide bond.

2. A method for making a recrystallized electrically conductive silicon carbide resistor having electrically conductive siliconized silicon carbide electrical contacts comprising the steps of:

a) resin bonding electrically conductive siliconized silicon carbide contacts to first and second ends of a recrystallized silicon carbide resistor where the siliconized silicon carbide contacts, when bonded to the resistor with siliconized silicon carbide, are sized to carry sufficient current to the silicon carbide resistor to obtain a temperature rise in the resistor above 600°C, without a more than 100°C rise in temperature of free ends of the contacts;

b) placing the silicon carbide resistor with resin bonded siliconized silicon carbide contacts into an induction heating furnace having an induction coil which heats electrically conductive material in the furnace when sufficient electrical power at a frequency of from about 300 to about 1000 KC is passed through the coil;

c) causing sufficient electrical power at a frequency of from about 300 to about 1000 KC to be passed through the coil to raise the temperature of the siliconized silicon carbide contacts and recrystallized silicon carbide resistor to a temperature above about 1500°C at the regions of the resin bonds to pyrolize the resin and cause silicon metal to flow from the contacts into the recrystallized silicon carbide to form a siliconized silicon carbide bond between the contacts and resistor; and

d) cooling the resulting recrystallized silicon carbide resistor to obtain a recrystallized silicon carbide resistor having siliconized silicon carbide contacts connected with siliconized silicon carbide bonds.

3. The method of claim 2 wherein the silicon metal flows from the contacts into the recrystallized silicon carbide to form a siliconized silicon carbide bond between the contacts and resistor in a partial vacuum of less than 20 Torr.

4. The method of claim 3 where the vacuum is less than 5 Torr.

5. The method of claim 2 wherein the silicon metal flows from the contacts into the recrystallized silicon carbide to form a siliconized silicon carbide bond between the contacts and resistor in an inert atmosphere comprising an inert gas.

6. The method of claim 5 wherein the inert gas is argon.

7. The method of claim 2 wherein the contacts are resin bonded to a resistor having a maximum width, exclusive of contacts, of from about 5 mm to about 100 mm, a length of from about 25 mm to about 2M and a ratio of length to maximum width in mm of from about 5:1 to about 50:1.

8. The method of claim 2 wherein the resistor and contacts are heated and bonded by siliconized silicon carbide in less than about 10 minutes.

9. The method of claim 2 wherein energy required to heat and bond the resistor and contacts is less than ten percent of energy required to create a similar bond in an electric resistance heated tube furnace.

10. The method of claim 1 wherein the silicon carbide and siliconized silicon carbide structures have longitudinal axes and the structures are bonded together so that the longitudinal axes are at an angle of between 20 and 90 degrees to each other.

11. The method of claim 1 wherein the silicon carbide structure and siliconized carbide structure and siliconized silicon carbide structure are placed into the furnace and are surrounded by zirconia bubbles as insulation.

12. The method of claim 2 wherein a plurality of silicon carbide structures secured to siliconized silicon carbide structures are simultaneously placed into the induction heating furnace at least partially within an induction coil.

13. The method of claim 1 wherein the structures have longitudinal axes, silicon carbide structures are secured to siliconized silicon carbide structures so that their longitudinal axes are coextensive to form a unit having a coextensive longitudinal axis and a plurality of units are placed into the induction heating furnace so that longitudinal axes of the plurality of units are parallel.

14. An apparatus for heating an electrically conductive article above about 600°C which comprises:

a) a pair of electrically conductive coils;

b) means for adjusting a distance between the coils of between 0 and about 5 meters; and

c) a source of electrical energy having a frequency of about 300 to about 1000 KC connected to the coils through a switch, where the source of electrical energy is sufficient to heat an electrically conductive article in a coil to above about 600°C when the switch is on.

15. The apparatus of claim 14 wherein the electrical energy is sufficient to heat the article to about 1500°C.

16. The apparatus of claim 14 wherein at least one of the coils is shaped so that two electrically conductive articles having longitudinal axes can be placed in contact with each other so that the longitudinal axes are at an angle of from about 20 to about 90 degrees to each other.